

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Steven Say-kyoun Ow and Tae Jin Eom

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Serial No. 09/121,152

Art Unit: 1731

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Examiner: Steve Alvo

For: Biological De-Inking Method

DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Howard Kaplan, hereby declare that:

1. I am employed at Enzymatic Deinking Technologies, Norcross, GA, as its chief operating officer. Enzymatic Deinking Technologies is the licensee of the above-identified patent application.
2. I instructed my laboratory manager, Jian Hua Ma, to conduct experiments to compare the deinking of recycled paper using the conditions described in example 2 of Japanese patent application No. 59-9299 ("the JPA") and the above-identified patent application.
3. I reviewed JPA to determine the conditions and materials described therein for the enzyme enhanced deinking of recycled paper. The only conditions were described in the examples. Example 1 added a number of materials other than an enzyme and NaOH. Example 2 examined the effect of adding 1% by weight NaOH and an alkaline cellulase. It was my understanding that the examiner preferred we use the conditions of Example 2 so that there would be fewer variables. We therefore conducted a comparison of the deinking of recycled

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U.S.S.N. 09/121,152
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paper as described in example 2, with the claimed method which requires a pH of less than 8, differing in the pH of the reaction mixtures and the cellulases which were added.

4. Example 2 does not provide a pH of the reaction mixture but instead refers to adding 1% (relative to the old newspaper) NaOH. This creates a pH of 10.6. For purposes of comparison, NaOH was not added to the reaction mixture of the claimed method. The pH of the reaction mixture was 7.2.

5. It was not possible to obtain any of the enzymes described at page 3 of the JPA. We contacted Amano Pharmaceutical Co. and tried to locate Ueda Kagaku, who are listed as the manufacturers. We also searched a number of catalogs and on the internet. Amano did not sell the named enzyme and Ueda appears to be out of business. We then obtained an equivalent alkaline cellulase from Meiji Seika, HEP-100, an alkaline cellulase which is active over a range of at least 4.0 to 10.0, with a pH optimum of 8.0. For purposes of comparison, a neutral cellulase was obtained from Novozymes, Novozym 342 produced by the fungus *Humicola insolens*, which has an optimum pH of between 6.5 and 7.5.

6. As described in Example 2 of the JPA, each reaction mixture contained old newspapers, cut in 2 x 5 cm pieces, fed into a laboratory disintegrator, water and, for the JPA study, 1.0% NaOH, relative to raw material old paper, and disintegration done at pulp concentration 5%, 40°C for 20 minutes. After disintegration, 0.2% enzyme relative to raw material old paper as described in example 2 was added to the mixture containing the 1% NaOH and an equivalent amount of enzyme added to the other reaction mixture, and stirring was done at 45°C for one hour. The pulped material was then concentrated to 15% pulp concentration, diluted to 1% by

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added water, and filtered through a Buchner funnel. The paper in the funnel and the filtrate were then analyzed.

7. The whiteness of the treated pulp (L-value) and the whiteness of the removed liquid (L-value) were determined for paper and filtrates from both samples.

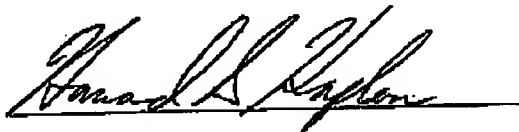
The results showed that the treatment at the lower pH was more effective than the treatment at the higher pH, despite the use of the 1% NaOH to swell the cellulose fibers and release the ink in the paper as well as the use of a cellulase.

	<u>Paper L-value</u>	<u>Filtrate L-value</u>
JPA sample with 1% NaOH	65.9%	60.6%
Ow sample at pH 7.2	66.6%	56.8%

8. Not only were the results superior without NaOH treatment, but the cost of the treatment in the absence of the NaOH is reduced since NaOH costs about \$300/ton on a 50% basis.

9. The undersigned declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements are punishable by fine or imprisonment or both under 18 U.S.C. 1001, and that such willful false statements may jeopardize the validity of the above-identified patent application or any patent issuing thereon.

Date:



Howard Kaplan